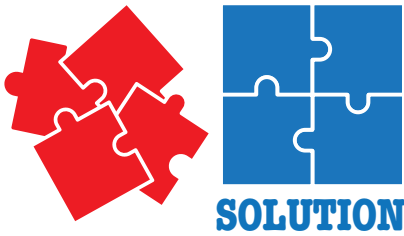


PROBLEM



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Making Factory Automation Flexible



Problem:

SOME MAJOR CHALLENGES for creating reliable manufacturing lines that meet a variety of requirements is flexibility. Standard automation solutions often focus on software fixes fashioned to adapt to a past model of highly stationary manufacturing production lines. These methods can fall short when trying to adapt to multiple changes that might occur over a few days. This is particularly true for companies that are seeing a lot of high-mix, low-volume orders coming in.

Today's manufacturers require the ability to adapt quickly to customer needs, which means they are faced with assembling small or varying lots quickly. Standard production line mentality makes it difficult to address these types of ever-changing demands. Changing a production line over to produce a different product is not only costly but time consuming and makes it difficult for companies to turn a profit from their small-run orders. In addition, production costs are climbing in a number of ways, including increased energy costs and increased costs in floor space. Start-ups are particularly sensitive to such overhead concerns.

Along with flexibility and energy costs, manufacturers are facing other challenges, an important one being how to resolve the increase in labor shortages that has become so prevalent in today's markets. Whether the labor shortage is from natural turnover or from issues based on seasonal production demands, companies need a method of production that alleviates the constant pressures related to hiring and training new personnel on a rotating basis.



Solution:

MANUFACTURERS HAVE NEVER been in a better position to reap the benefits of the latest solution to their need for flexibility, reliability, and space and energy savings. Modularization is the key to achieving these outcomes in a cost-effective way (see Figure 1). Modular systems allow companies to structure their production floor in multiple configurations—rearranging elements according to the particular production requirements.

Modular automation is the next generation of factory automation where familiar production line components are separated into modules so that they can be quickly reconfigured to adapt to different requirements within the same or more limited space allocation (see Figure 2). This is a rapidly expanding form of automation that allows traditional assembly lines to transform into modular assembly lines quickly.

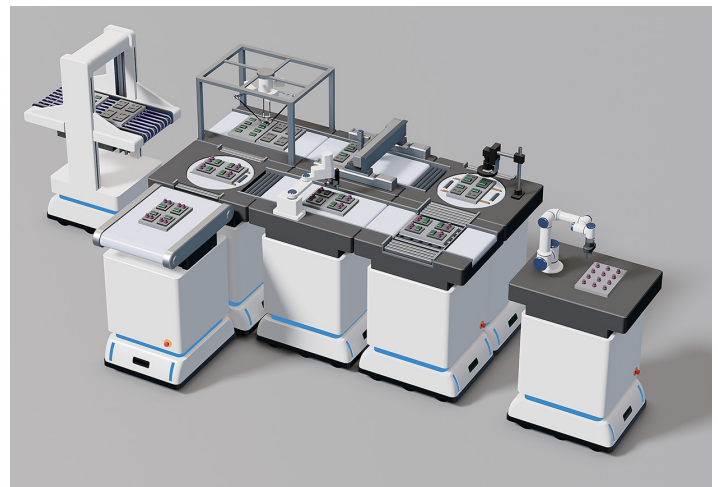


Figure 1: Modular production components can easily adapt to the particular needs of the production line rather than being locked into the maze of a permanent structure.

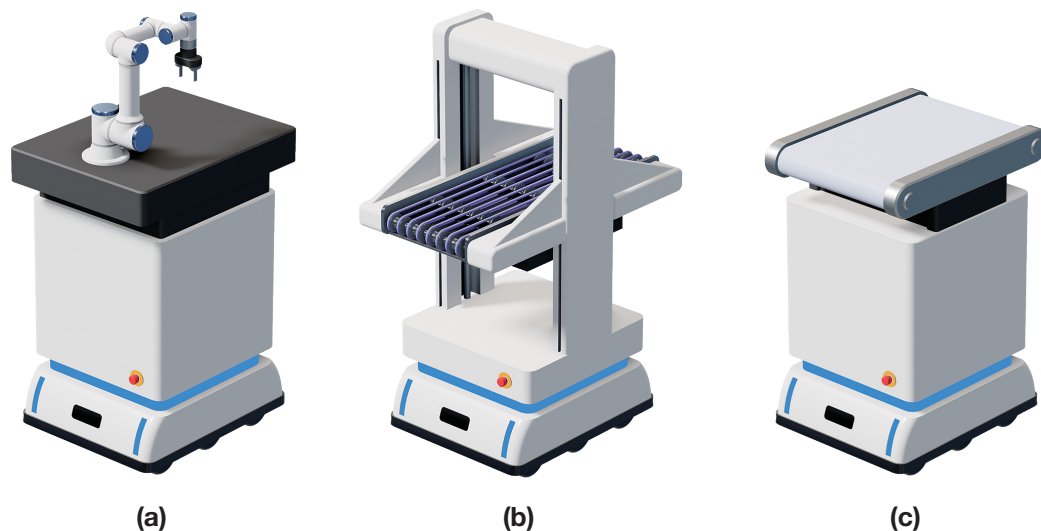
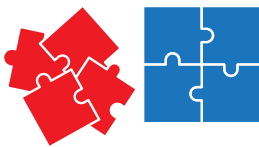


Figure 2a, b, & c: Shown are three of the multiple ways a modular production system can adapt to the short-run production needs of a customer. 1a is an articulated arm type transportation robot, 1b is a lifting and lowering type transportation robot, and 1c shows a conveyor type transportation robot.

and easily. Modular components are battery operated, eliminating the need to route AC power lines throughout your production area. Since they are able to reconfigure as many times as needed, they are completely adaptable to all manner of production requirements.

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An example of modular automation might be converting some of the conveyors that are part of a standard production line to mobile robots. The robot, which has a small turning radius, can not only move from station to station easily but can do so within a more limited space (see **Figure 3**). By incorporating these types of work transportation robots between several processes, users gain the benefits of a

more efficient production line. By modularizing equipment for each of your processes, multiple levels of flexibility become apparent. Layout changes can be implemented according to the product being produced rather than adjusting the product to fit your standard manufacturing floor layout.

To best realize what modularization is capable of, manufacturers have chosen to unify their equipment within certain sizes as well

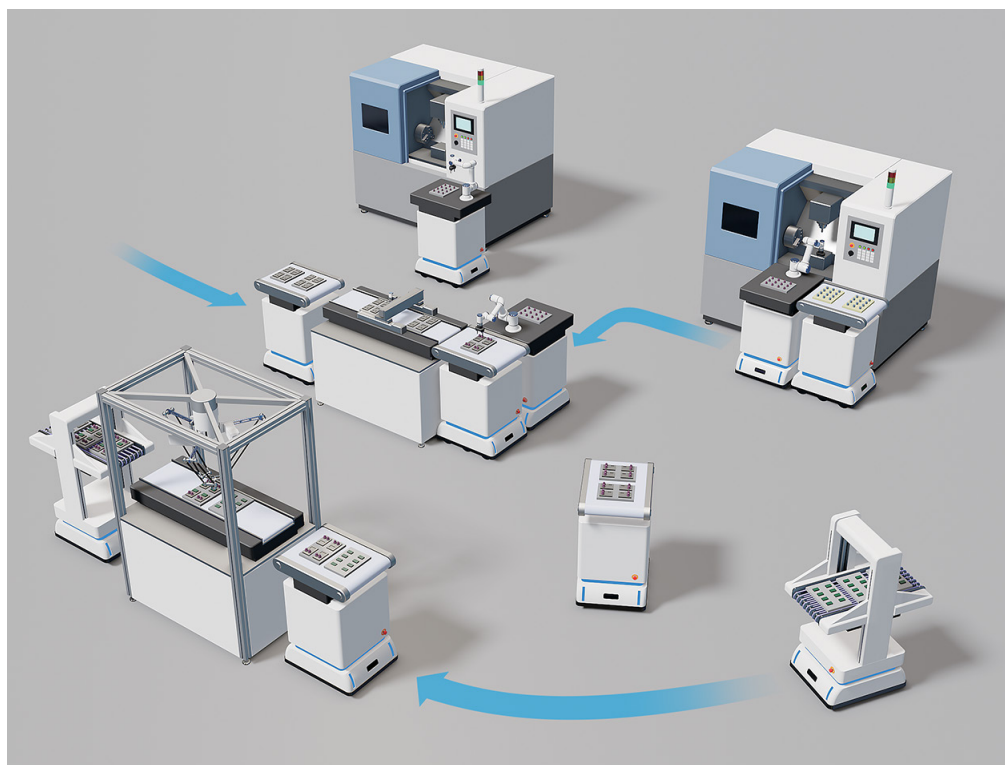
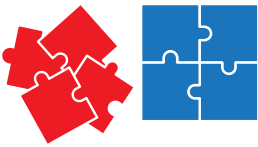
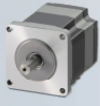


Figure 3: This illustration indicates how easily work transportation robots can move between processes. This is particularly important when machines that offer specialized functionality—perhaps a deburring or special cleaning operation—is not situated as part of the production line but can be included as though it is.

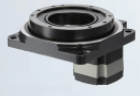


α STEP AZ Series mini driver & motor/actuator


DC Input Motors




Hollow Rotary Actuators




Rack-and-pinion Systems




mini Drivers
RS-485 Communication Type




Electric Linear Slides



Electric Grippers




Compact Electric Cylinders




Oriental Motor's **α STEP** is now equipped with a newly developed absolute mechanical encoder, no back up battery required. The **AZ** Series mini driver has been designed to be compact and lightweight, freeing up valuable cabinet space. Combine it with the wide product selection of the **AZ** Series.

Robot Controllers MRC01

Multi-axis robot controller, easy to use, program, ideal for in-house built applications.



Brushless Motors BLV Series R Type



Redesigned, compact driver and motor. Slow speed, 1 rpm up to 4,000 rpm. Designed to support battery-powered applications.

Figure 4: The AZ Series is a complete family of products that are designed specifically for modular manufacturing solutions.

as simplify the power supply wiring. Such modular sections provide a number of benefits, including compactness, light weight, and the ability to move on their own autonomously.

A number of companies are featuring their ability to produce modular solution, including Oriental Motor, which implements their high-quality, high-power compact and lightweight DC-powered products, such as their AZ Series mini driver and their BLV Series R Type brushless motor line. The AZ Series is a complete family of fractional horsepower motors, actuators, and network drives that feature an absolute sensor, closed-loop control, and are designed to easily work with the company's multi-axis MRC01 controller (**see Figure 4**). This family is ideal to support the motor drive technologies needed for the design of application-specific robots.

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